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DIVISION 11 - EQUIPMENT

SECTION 11400

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SECTION 11400

KITCHEN APPLIANCES

PART 1 GENERAL

This section covers the furnishing and installation of undercounter-type and free-standing refrigerators, electric range and exhaust hood, and microwave oven as indicated and specified.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Appliance Colors; GA.

Color chips shall be submitted for color selection.

SD-19 Operation and Maintenance Manuals

Appliance Instructions; FIO.

Manufacturer's instructions for installation and maintenance shall be submitted, together with manufacturer's warranty.

PART 2 PRODUCTS

The appliances shall be a standard model, as manufactured by reputable firms which have been in the residential and/or commercial appliance manufacture and/or assembly business for at least 20 years. Appliance sizes shall be coordinated for fit into casework as shown. Electrical circuits shall be as recommended by the manufacturer and as described in SECTION: LOCK ELECTRICAL WORK.

2.1 Free-Standing Refrigerator

The free-standing refrigerator shall be a two door, refrigerator-freezer unit with a top mounted frost-free freezer and 17.5 cubic feet, minimum, of combined refrigerator-freezer capacity. The freezer compartment shall be 4.5 cubic feet, minimum. The freezer compartment shall be equipped with an automatic ice maker.

2.2 Microwave Oven

The microwave oven shall be 800 watt power, 0.8 cubic foot capacity with touch pad controls. Microwave oven shall have a minimum of 10 power settings and an electronic digital display with clock/timer.

2.3 Electric Range

Shall be freestanding type with self cleaning oven. Oven shall have window in door, door to be removable, and interior oven light. Range to have clock and 60 minute timer and automatic oven timer. Coordinate colors with other appliances.

2.4 Exhaust Hood

Shall be furnished by range manufacturer. Hood shall have 2 speed fan control, cooktop lamps and grease filter. Color shall match range.

PART 3 EXECUTION

3.1 INSTALLATION

The appliances shall be set and adjusted to assure proper operation of doors, and proper ventilation to the units as required by the manufacturer.

The unit shall be cleaned, left neat and sightly, and be installed complete, ready for use.

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SECTION 12491
VERTICAL BLINDS

PART 1 GENERAL

This section covers the furnishing and installation of vertical blinds as indicated and specified herein. Vertical blinds shall be installed on windows in:

- a. Lunch/Conference room (Room 203) including windows at stairs;
- b. Lockmasters office (Room 202).

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

NATIONAL FIRE PROTECTION (NFPA)

NFPA 701	(1996) Methods of Fire Tests for Flame-Resistant Textiles and Films
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1.2 GENERAL

Window treatment shall be provided, complete with necessary brackets, fittings, and hardware. Each window treatment type shall be a complete unit provided in accordance with paragraph WINDOW TREATMENT PLACEMENT SCHEDULE. Equipment shall be mounted and operated as indicated. Windows to receive a treatment shall be completely covered. The Contractor shall take measurements at the building and shall be responsible for the proper fitting and hanging of the equipment.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Vertical Blind Data; FIO.

Manufacturer's data for the window treatments and hardware composed of catalog cuts, brochures, product information, and maintenance instructions shall be submitted. A copy of the manufacturers standard warranty shall be provided. A chart showing available colors for the vanes shall be included.

SD-14 Samples

Vertical Blind Sample; FIO.

A sample of the vertical blinds shall be submitted. Blind slats or vanes

shall be 6 inches in length and the track shall be 6 inches in length.

1.4 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the jobsite in the manufacturer's original packaging with the brand or company name, item identification, and project reference clearly marked. Components shall be stored in a dry location that is adequately ventilated and free from dust, water, or other contaminants and shall have easy access for inspection and handling.

1.5 FIELD MEASUREMENTS

The Contractor shall become familiar with details of the work, verify dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

PART 2 PRODUCTS

Window treatment shall be provided, complete with necessary brackets, fittings, and hardware. Each window treatment type shall be a complete unit. Windows to receive a treatment shall be completely covered. The Contractor shall take measurements at the building and shall be responsible for the proper fitting and hanging of the equipment.

2.1 WINDOW BLINDS

Each blind, including hardware, accessory items, mounting brackets and fastenings, shall be provided as a complete unit produced by one manufacturer. All parts shall be colors as selected by the Contracting Officer. Steel features shall be treated for corrosion resistance.

2.2 VERTICAL BLINDS

Vertical blind units shall be capable of nominally 180 degree partial tilting operation and full stackback. The blinds shall be listed by the manufacturer as designed for heavy duty strength applications including heavy duty hardware. Vertical blinds shall be wall mounted with inside brackets. Blinds shall be sill length.

2.2.1 Vanes

The vanes shall be 3-1/2 inches and shall overlap not less than 3/8 inch. A weight shall be provided at the bottom of the vane. Fabric vanes shall be inherently flame retardant. The vanes shall have straight, flat, unfrayed edges and shall be flat, without noticeable twists and shall be dimensionally stable. Fabric inserts shall be flame retardant and colorfast and shall not discolor the fabric.

2.2.2 Carriers

Carriers shall be provided to support each vane. Carriers shall be of molded plastic and shall transverse on self-fabricated wheels for smooth, easy operation. The hook of the carrier shall have an automatic latch to permit easy installation and removing of the vane, and shall securely lock the vane for tilting and traversing.

2.2.3 Headrail System

Headrail system shall be not less than 0.047 inch thickness and shall be made of anodized aluminum alloy or 0.027 inch thick phosphate treated steel with a baked on ivory gloss enamel paint finish. The headrail shall extend the full width of the blind and each end shall be closed with an end cap. One cap shall contain the traversing and tilting controls. The opposite cap shall house the pulley for the traversing cord.

2.2.4 Valance

Manufacturers standard valance shall be attached to the headrail by metal or plastic holders which grip the top and bottom edge of the valance and shall accept an insert of the same material as the slats. There shall be sufficient clearance behind the valance to permit the vanes to tilt without interference. The headrail cover shall extend the full width of the blind.

Returns shall be formed of a single piece where the end of the head is visible.

2.2.5 Controls

Tilting control and traversing controls shall hang compactly at the right side of the blinds and shall reach within 5 feet of the floor. The bead chain tilting control shall tilt all vanes simultaneously to any desired angle and hold them at that angle. The vanes shall traverse one way to the right. The traversing control cord shall be minimum 0.070 inch in diameter with a minimum breaking strength of 125 pounds. The cord shall be anchored to a lead carrier which shall be linked to all adjacent carriers. The vanes shall be traversed along the headrail by pulling one side of the looped cord. A weighted pulley shall be provided at the bottom of the cord.

2.2.6 Connectors and Spacers

The connector shall be flexible, smooth and flat to slide unhindered when carriers move independently of each other, and to nest compactly when carriers are stacking. The length of the links shall relate to the vane width in order to equally space the traversing vanes, to maintain uniform and adequate overlap of vanes, and to fully cover the width of the opening.

2.2.7 Intermediate Brackets

Intermediate installation brackets shall be furnished for blinds over 62 inches wide.

PART 3 EXECUTION

3.1 SCHEDULE

Installation shall not be initiated until completion of room painting and finishing operations.

3.2 MEASURING

Measuring for window treatments and positioning shall be strictly in accordance with the manufacturer's instructions. Marks showing the precise position of all brackets, pulleys, and metal hemline positions as related to the factory measuring instructions shall be provided.

3.3 INSTALLATION

Installation shall be in accordance with the approved detail drawings and manufacturer's installation instructions. Units shall be level, plumb, secure, and at proper height and location relative to window units. The Contractor shall furnish and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Upon completion of the installation, window treatments shall be adjusted for form and appearance, shall be in proper operating condition, and shall be free from damage or blemishes. Damaged units shall be repaired or replaced by the Contractor as directed by the Contracting Officer.

3.4 QUALITY CONTROL

Upon completion of the installation, window treatments shall be adjusted for form and appearance, shall be in proper operating condition, and shall be free from damage or blemishes. Damaged units shall be repaired or replaced by the Contractor as directed by the Contracting Officer.

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SECTION 12494

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- 3.4 QUALITY CONTROL

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SECTION 12494

WINDOW SHADES

PART 1 GENERAL

This section covers the furnishing and installation of window shades as indicated and specified herein. Window shades shall be installed on all windows in the Control Room (room 103), and on all windows in the Downstream Control Stand (Room CS1).

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3951 (1995) Commercial Packaging

ASSOCIATION OF INDUSTRIAL METALIZERS, COATERS AND LAMINATORS
(AIMCAL)

AIMCAL () Standard Methods

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Shade Data; FIO.

Catalog data describing the shade and hardware shall be submitted. A chart showing available colors for the shade film shall be included.

SD-14 Samples

Shade Sample; FIO.

One complete shade unit, including roller mechanism and mounting hardware shall be provided.

1.3 PACKAGING

Packaging shall be in accordance with ASTM 3951, Level "B". Shades shall be packaged to afford adequate protection against deterioration and damage during shipment.

PART 2 PRODUCTS

2.1 MATERIALS

Material furnished by the Contractor shall be complete in accordance with all specification requirements and shall include the following items.

2.1.1 Shade Material

Shade material shall be a transparent plastic sheet of mylar or a polyester-type polymer. The shade film shall be tinted with a smoke-grey color. The shade film construction shall be four-ply laminated polyester film. The two laminated center sheets shall each be 1.5 mil thick. A clear 1 mil thick polyester film shall be laminated to each side of the gray dyed film laminate. One exposed side of the shade film shall be protected with a scratch-resistant coating. The final film construction will be 5 mils thick, optically clear, and totally transparent. Surface tinting and colored adhesives will not be an acceptable equal. The shade film shall have the following Solar Optical properties:

A. Visible Light. The shade shall transmit no more than 6 percent of the visible solar energy (from 380 to 780 nanometers) when measured by the AIMCAL standard methods.

B. Ultra-Violet. The shade shall transmit no more than 4 percent of the ultra-violet solar energy (from 300 to 380 nanometers) when measured by AIMCAL standard methods.

C. Total Solar Energy. The shade shall reject 48 percent of the total solar energy transmitted from 360 to 2,100 nanometers when measured by AIMCAL standard methods.

2.2 SHADE ASSEMBLY

2.2.1 Bottom Bar

Shades shall have a full width metal hemline bar. The bar shall be flat 1 inch by 1/2 inch, dull black, and fabricated from 26 gauge sheet metal. The pull cord and shade shall attach to the center of the hemline bar. Black plastic caps shall be provided on each end of the hemline bar to cover any sharp exposed edges. The hemline bar shall maintain constant tension in the shades.

2.2.2 Shade Cords

Cords shall be black in color and of sufficient length to route around stairwell and equipment to cord lock positions. The cords shall be 9/64-inch diameter rope made of 4.5 Duro Nylon or approved equal.

2.2.3 Shade Rollers

Shades shall be mounted on 1-3/4 inch diameter metal-wrapped rollers. The rollers shall be a spring loaded, single piece barrel. The roller shall be securely restrained from falling out of the mounting brackets. Mounting brackets shall have a 2-1/8 inch resting ledge (regular "industry norm" ceiling brackets are not acceptable). The shade film shall be mounted on rollers so as to minimize ridging. Each shade shall identify the proper roll-off direction and the proper hanging orientation (such as a label stating "THIS END DOWN").

2.2.4 Shade Labels

Each shade shall have a manufacturer's label attached to the hemline bar giving cleaning instructions and a telephone number for service.

2.2.5 Lock Pulley and Cord Direction Change Pulley

Lock pulleys shall consist of a roller and a spring-return, side-action cam cord grip. Cord direction change pulleys shall be provided to route shade cords around obstructions where they exist. Pulleys shall be positioned in direct line with cord outlet on metal hemline.

2.2.6 Fabrication

Shade roller width shall be within 1/2-inch from physical limitations. To insure safe roll-up, a minimum of 15 inches of shade material shall remain on the roller when the shade is fully extended.

PART 3 EXECUTION

3.1 MEASURING

Measuring for shades and positioning shall be strictly in accordance with the shade manufacturer's instructions. Marks showing the precise position of all brackets, pulleys, and metal hemline positions as related to the factory measuring instructions shall be provided. All measurements shall be taken per instructions from the shade manufacturer.

3.2 SCHEDULE

Installation shall not be initiated until completion of room painting and finishing operations.

3.3 INSTALLATION

Shades shall be installed in shade recess pockets or on wood or metal plates. Installation shall be in accordance with the detail drawings and manufacturer's installation instructions. Units shall be level, plumb, secure, and at proper height and location relative to window units. The Contractor shall furnish and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation.

3.4 QUALITY CONTROL

Upon completion of the installation, window treatments shall be adjusted for form and appearance, shall be in proper operating condition, and shall be free from damage or blemishes. Damaged units shall be repaired or replaced by the Contractor as directed by the Contracting Officer. Spring tension in rollers shall be manually adjusted so that shades roll up comfortably. The shade travel shall be controlled and limited to prevent the metal hemline bar from hitting the window sill and to prevent the metal hemline bar from hitting and overrunning the shade roller.

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SECTION 13280

ASBESTOS ABATEMENT

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

The work covered by this section includes the removal of asbestos-containing materials (ACM) which are encountered during demolition activities associated with this project. The following ACM locations require abatement:

1. Central Control Station
 - a. "saw-dust" concrete roof
 - b. asbestos shingles
2. Central Control Station - electrical control panels
 - a. (14) black circuit boards
 - b. wiring
 - c. busse bars
3. Upper and Lower Control Stations
 - a. wiring
4. Wire Galleries (manholes)
 - a. cable trays

Further description of the ACM is included in the Asbestos Survey conducted in 1987, attached at the end of this section. Asbestos items with a rating greater than 1 have been previously removed. Some of the asbestos ratings have been assumed from samples obtained from other Lock sites. A complete copy of the asbestos survey report is available through the Contracting Officer. Concrete from the lockhouse roof at Lock 6 was tested in March 1999, and found to contain 1 to 5% Chrysotile.

1.1.1 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer who will have the option of ordering bulk samples to be analyzed. Any additional components identified as ACM that have been approved by the Contracting Officer for removal shall be removed by the Contractor and will be paid for by an equitable adjustment to the contract price under the CONTRACT CLAUSE titled "changes".

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2	(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
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ANSI Z87.1 (1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection

ANSI Z88.2 (1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1331 (1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents

ASTM E 1368 (1997) Visual Inspection of Asbestos Abatement Projects

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

40 CFR 61 National Emissions Standards for Hazardous Air Pollutants

40 CFR 763 Asbestos

49 CFR 107 Hazardous Materials Program Procedures

49 CFR 171 General Information, Regulations and Definitions

49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

49 CFR 173 Shippers - General Requirements for Shipments and Packagings

ENGINEERING MANUALS (EM)

EM 385-1-1 (1996) Safety and Health Requirements Manual

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90-018 (1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance

EPA 340/1-90-019 (1990) Asbestos/NESHAP Adequately Wet Guidance

UNDERWRITERS LABORATORIES (UL)

UL 586 (1996) High-Efficiency, Particulate, Air Filter Units

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials and Equipment; FIO.

Manufacturer's catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information. Data shall include, but shall not be limited to, the following items:

- High Efficiency Filtered Air (HEPA) local exhaust equipment
- Vacuum cleaning equipment
- Pressure differential monitor for HEPA local exhaust equipment
- Air monitoring equipment
- Respirators
- Personal protective clothing and equipment
- Glovebag
- Strippable Coating
- Prefabricated Decontamination Unit

SD-08 Statements

Training Program; FIO.

A copy of the written project site-specific training material as indicated in 29 CFR 1926, Section .1101 that will be used to train onsite employees. The training document shall be signed by the Contractor's Designated IH and Competent Person.

SD-09 Reports

Cleanup and Disposal; FIO.

Waste shipment records. Weigh bills and delivery tickets shall be furnished.

1.4 DEFINITIONS

- j. Class I Asbestos Work: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.
- k. Class II Asbestos Work: Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos- containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glovebag may be classified as a Class III job.
- l. Class III Asbestos Work: Activities defined by OSHA that involve repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling

through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

- m. Class IV Asbestos Work: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean-up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists and cleaning up loose ACM debris from TSI or surfacing ACM following construction.

1.5 QUALIFICATIONS

The Contractor shall designate in writing, personnel meeting the following qualifications:

- d. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment" in this paragraph.
- e. Worker Training and Certification of Worker Acknowledgment: Training documentation will be required for each employee who will perform asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section.
- i. Disposal Facility, Transporter: The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61, Section .150(b), and other applicable state or local requirements.

1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials.

1.7 SAFETY AND HEALTH PROGRAM AND PLANS

The Contractor shall develop and submit a written comprehensive site-specific Accident Prevention Plan at least 30 days prior to start of work. The Accident Prevention Plan shall address requirements of EM 385-1-1, Appendix A, covering onsite work to be performed by the Contractor and subcontractors. The Accident Prevention Plan shall incorporate an Asbestos Hazard Abatement Plan, and Activity Hazard Analyses as separate appendices into 1 site specific Accident Prevention Plan document. The plan shall be prepared, signed (and sealed, including certification number if required), and dated by the Contractor's Designated IH, Competent Person, and Project

Supervisor.

1.7.1 Asbestos Hazard Abatement Plan Appendix

The Asbestos Hazard Abatement Plan appendix to the Accident Prevention Plan shall include, but not be limited to, the following:

- a. The personal protective equipment to be used;
- b. The location and description of regulated areas including clean and dirty areas, access tunnels, and decontamination unit (clean room, shower room, equipment room, storage areas such as load-out unit);
- c. Initial exposure assessment in accordance with 29 CFR 1926, Section .1101;
- d. Level of supervision;
- e. Method of notification of other employers at the worksite;
- f. Abatement method to include containment and control procedures;
- g. Interface of trades involved in the construction;
- h. Sequencing of asbestos related work;
- i. Storage and disposal procedures and plan;
- j. Type of wetting agent and asbestos encapsulant to be used;
- k. Location of local exhaust equipment;
- l. Air monitoring methods (personal, environmental and clearance);
- m. Bulk sampling and analytical methods (if required);
- n. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations;
- o. Fire and medical emergency response procedures;
- p. The security procedures to be used for all regulated areas.

1.7.2 Activity Hazard Analyses Appendix

Activity Hazard Analyses, for each major phase of work, shall be submitted and updated during the project. The Activity Hazard Analyses format shall be in accordance with EM 385-1-1 (Figure 1-1). The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity Hazard Analyses has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the onsite Government representatives. The Activity Hazard Analyses shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

1.8 LICENSES, PERMITS AND NOTIFICATIONS

Necessary licenses, permits and notifications shall be obtained in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. The Contractor shall notify the state's environmental protection agency responsible for asbestos air emissions in accordance with 40 CFR 61, Subpart M. For licenses, permits, and notifications that the Contractor is responsible for obtaining, the Contractor shall pay any associated fees or other costs incurred.

1.9 REGULATED AREAS

All Class I, II, and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they shall demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

PART 2 PRODUCTS

2.1 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

2.2 LOCAL EXHAUST VENTILATION

Local exhaust ventilation units shall conform to ANSI Z9.2 and 29 CFR 1926, Section .1101. Filters on local exhaust system equipment shall conform to ANSI Z9.2 and UL 586. Filter shall be UL labeled.

2.3 PERSONAL PROTECTIVE EQUIPMENT

All personal protective equipment (PPE) removed from the regulated area shall be thoroughly decontaminated or disposed of as ACM waste. Personnel exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn and disposed of properly.

- a. Gloves. Gloves shall be provided to protect the hands. Where there is the potential for hand injuries (i.e., scrapes, punctures,

cuts, etc.) a suitable glove shall be provided and used.

b. Foot Coverings. If rubber boots are not used, disposable foot covering shall be provided.

c. Head Covering. Hood type head covering shall be provided.

d. Protective Eye Wear. Eye protection provided shall be in accordance with ANSI Z87.1.

e. Respiratory Protection. Respiratory protection provided shall be in accordance with ANSI Z88.2.

2.4 RESPIRATORY PROTECTION

2.4.1 Class I Work

The Contractor shall provide: (1) a tight-fitting, powered air purifying respirator equipped with high efficiency filters, or (2) a full-facepiece supplied air respirator operated in the pressure demand mode, equipped with HEPA egress cartridges, or (3) an auxiliary positive pressure self-contained breathing apparatus, for all employees within the regulated area where Class I work is being performed; provided that a negative exposure assessment has not been produced, and that the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full-facepiece supplied air respirator, operated in the pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

2.4.2 Class II and III Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment; and Class III jobs where TSI or surfacing ACM is being disturbed.

2.5 HYGIENE FACILITIES AND PRACTICES

A decontamination area (equipment room/area) shall be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment produced before the operation. The equipment room or area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

2.6 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture

and collection system. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

2.7 EXPENDABLE SUPPLIES

2.7.1 Glovebag

Glovebags shall be provided as described in 29 CFR 1926, Section .1101 and SET-UP DETAIL SHEET 10. The glovebag assembly shall be 6 mil thick plastic, prefabricated and seamless at the bottom with preprinted OSHA warning label.

2.7.2 Disposal Bags

Leak-tight bags, 6 mil thick, shall be provided for placement of asbestos generated waste as described in DETAIL SHEET 9A.

2.7.3 Sheet Plastic

Sheet plastic shall be polyethylene of 6 mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams.

2.7.4 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

2.7.5 Leak-tight Wrapping

Two layers of 6 mil minimum thick polyethylene sheet stock shall be used for the containment of removed asbestos-containing components or materials such as reactor vessels, large tanks, boilers, insulated pipe segments and other materials too large to be placed in disposal bags as described in DETAIL SHEET 9B. Upon placement of the ACM component or material, each layer shall be individually leak-tight sealed with duct tape.

2.7.6 Wetting Agents

Removal encapsulant (a penetrating encapsulant) shall be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant shall be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated

by the Contractor at no expense to the Government, as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist.

3.3 BUILDING VENTILATION SYSTEM AND CRITICAL BARRIERS

Building ventilating systems supplying air into or returning air out of a regulated area shall be shut down in accordance with 29 CFR 1910, Section .147. Air-tight critical barriers shall be installed on building ventilating openings located inside the regulated area that supply or return air from the building ventilation system or serve to exhaust air from the building. Edges to wall, ceiling and floor surfaces shall be sealed with industrial grade duct tape.

3.4 METHODS OF COMPLIANCE

3.4.1 Mandated Practices

The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M, and the specified requirements. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including, but not limited to, details of construction materials, equipment, and handling procedures. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

- a. Vacuum cleaners equipped with HEPA filters to collect debris and dust containing ACM.
- b. Wet methods or wetting agents to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup; except where it can be demonstrated that the use of wet methods is unfeasible due to, for example, the creation of electrical hazards, and equipment malfunction.
- c. Prompt clean-up and disposal in leak-tight containers of wastes and debris contaminated with asbestos.
- d. Inspection and repair of polyethylene in work and high traffic areas.
- e. Cleaning of equipment and surfaces of containers filled with ACM prior to removing them from the equipment room or area.

3.4.2 Control Methods

The Contractor shall use the following control methods to comply with the PELs:

- a. Local exhaust ventilation equipped with HEPA filter dust collection systems;
- b. Enclosure or isolation of processes producing asbestos dust;
- c. Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;
- d. Use of other work practices and engineering controls;

- e. Where the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the PELs, the Contractor shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with paragraph, RESPIRATORY PROTECTION PROGRAM.

3.4.3 Unacceptable Practices

The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

- a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
- b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- c. Dry sweeping, shoveling, or other dry clean-up of dust and debris containing ACM.
- d. Employee rotation as a means of reducing employee exposure to asbestos.

3.4.4 Class I Work Procedures

In addition to requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

- a. A Competent Person shall supervise the installation and operation of the control system.
- b. For jobs involving the removal of more than 25 feet or 10 square feet of TSI or surfacing material, the Contractor shall place critical barriers over all openings to the regulated area.
- c. HVAC systems shall be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.
- d. Impermeable dropcloths (6 mil or greater thickness) shall be placed on surfaces beneath all removal activity.
- f. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area shall be ventilated to move contaminated air away from the employee's breathing zone toward a HEPA unit or collection device.

3.4.5 Specific Control Methods for Class I Work

In addition to requirements of paragraph Class I Work Procedures, Class I asbestos work shall be performed using the control methods identified in

the subparagraphs below.

3.4.5.1 Negative Pressure Enclosure (NPE) System

The system shall provide at least 4 air changes per hour inside the containment. The local exhaust unit equipment shall be operated 24 hours per day until the containment is removed, and shall be leak-proof to the filter and equipped with HEPA filters. Air movement shall be directed away from the employees and toward a HEPA filtration device. The building ventilation system shall not be used as the local exhaust system for the regulated area. The local exhaust system shall terminate outdoors unless an alternate arrangement is allowed by the Contract Officer. All filters used shall be new at the beginning of the project and shall be periodically changed as necessary and disposed of as ACM waste.

3.4.5.2 Glovebag Systems

The glovebag system shall be used to remove ACM from straight runs of piping and elbows and other connections. Glovebags shall be installed to completely cover the circumference of pipe or other structures where the work is to be done. Glovebags shall be used only once and shall not be moved. Prior to disposal, glovebags shall be collapsed by removing air within them using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation shall be wrapped and sealed in 2 layers of plastic or otherwise rendered intact.

3.4.5.3 Mini-Enclosures

Mini-containment (small walk-in enclosure) to accommodate no more than 2 persons, may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices. The mini-enclosure shall be inspected for leaks and smoke tested before each use. Air movement shall be directed away from the employee's breathing zone within the mini-enclosure.

3.4.5.4 Wrap and Cut Operation

Prior to cutting pipe, the asbestos-containing insulation shall be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps shall be taken: install glovebag, strip back sections to be cut 6 inches from point of cut, and cut pipe into manageable sections.

3.4.6 Specific Control Methods for Class II Work

3.4.6.1 Gaskets

Gaskets shall be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag. Any scraping to remove residue shall be performed wet.

3.4.7 Specific Control Methods for Class III Work

Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees. The work shall be performed using wet methods and, to the extent feasible, using local exhaust ventilation. The Contractor shall use impermeable dropcloths and shall

isolate the operation, using mini-enclosures or glovebag systems, where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material.

3.4.8 Cleaning After Asbestos Removal

After completion of all asbestos removal work, surfaces from which ACM has been removed shall be wet wiped or sponged clean, or cleaned by some equivalent method to remove all visible residue.

3.5 FINAL CLEANING AND VISUAL INSPECTION

Upon completion of the final cleaning, the Contractor and the Contracting Officer shall conduct a final visual inspection of the cleaned regulated area in accordance with ASTM E 1368 and document the results on the Final Cleaning and Visual Inspection as specified on the SET-UP DETAIL SHEET 19.

3.6 EXPOSURE ASSESSMENT AND AIR MONITORING

Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926, Section .1101. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section. For environmental and final clearance, air monitoring shall be conducted at a sufficient velocity and duration to establish the limit of detection of the method used at 0.005 f/cc. Results of breathing zone samples shall be posted at the job site and made available to the Contracting Officer. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes.

3.7 CLEANUP AND DISPOSAL

3.7.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

3.7.2 Collection and Disposal of Asbestos

All ACM waste including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in approved containers. Waste within the containers shall be wetted in case the container is breached. For temporary storage, sealed impermeable containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e., dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by the Contracting Officer. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards.

3.7.3 Asbestos Waste Shipment Record

The Contractor shall complete and provide the Contracting Officer final completed copies of the Waste Shipment Record for all shipments of waste

material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill. Each Waste Shipment Record shall be signed and dated by the Contractor, the waste transporter and disposal facility operator.

TABLE 1

INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet _____ of _____

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER _____
2. LOCATION OF WORK TASK _____
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: _____
- a. Type of Asbestos _____
- b. Percent asbestos content _____%
4. ABATEMENT TECHNIQUE TO BE USED _____
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK _____
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK
Friable _____ Non-friable Category I _____
Non-friable Category II _____
7. FORM _____ and CONDITION OF ACM: GOOD _____ FAIR _____ POOR _____
8. QUANTITY: METERS _____, SQUARE METERS _____
- 8a. QUANTITY: LINEAR FT. _____, SQUARE FT. _____
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK _____
10. SET-UP DETAIL SHEET NUMBERS
FOR WORK TASK _____, _____, _____, _____,
_____, _____, _____, _____.

NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile, amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____
PROJECT ADDRESS _____
CONTRACTOR FIRM NAME _____
EMPLOYEE'S NAME _____, _____, _____,
(Print) (Last) (First) (MI)

Social Security Number: _____-_____-_____,

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:

_____ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

_____ b. For Workers:

_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

_____ (3) For OSHA Class II work (there will only be abatement of one type of Class II material):
_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926, Section .1101(g) and hands-on training.

_____ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101, and hands-on training.

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101(g) and hands-on training.

_____ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:

_____ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:

_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:

_____ I have been trained in the proper selection, fit, use, care, cleaning, maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:

_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks.

_____ were identified physical limitations to performing the required work tasks.

Date of the medical examination _____

Employee Signature _____ date _____

Contractor's Industrial

Hygienist Signature _____ date _____

ATTACHMENT: M-25 Asbestos Survey
Lock and Dam #2 - #10
NOVA Project # M87-1051

INTRODUCTION

NOVA Environmental Services, Inc. Conducted an asbestos survey of the Lock and Dams on the Mississippi River. The complex consists of lock and dams #2 in Hastings, Minnesota, #3 in Red Wing, Minnesota, #4 in Alma, Wisconsin, #5 in Minneiska, Minnesota, #5A in Winona, Minnesota, #6 in Trempealeau, Wisconsin, #7 in LaCrescent, Minnesota, #8 in Genoa, Wisconsin, #9 in Eastman, Wisconsin and #10 in Guttenberg, Iowa. The purpose of this survey was to identify locations, and provide recommendations for the disposition of asbestos-containing material in the lock and dams.

PROCEDURE

The lock and dams were examined by NOVA personnel for the purpose of identifying asbestos-containing material. Representative samples, of both friable and non-friable material, were obtained by removing a small amount of suspect material and placing it in a 50 cc clear plastic jar. Before sampling, the material was wetted with amended water which reduces the number of fibers released to the environment when the sample is removed. The sections of insulation that were damaged during sampling were repaired with an EPA recommended encapsulant.

During the survey, 152 bulk samples were obtained from the complex. All of these samples were analyzed using polarized light microscopy, promulgated as 40 CFR 763 in the Federal Register, Vol. 47, No.103, 1982, to verify the presence or absence of asbestos fibers. The types of materials sampled were ceiling materials, floor tile, pipe insulation, wall material, and electrical wiring/panels.

The following is an explanation of our condition rating system that is used in Table I.

0 - No Problem - The material in the area does not contain asbestos.

1 - Potential Problem Only During Remodeling - The material in this area does contain asbestos, but is currently in a non-friable condition and does not present a risk unless cut, drilled, sanded, or otherwise abraded.

2 - Potential Problem, Maintenance Controllable - Room has friable asbestos-containing materials. Material has low potential of being disturbed. Exposure risk can be controlled with an in-house maintenance program.

3 - Potential Problem Requiring Abatement - Area has friable asbestos-containing material having a high potential for disturbance, and thereby requires abatement procedures.

4 - Immediate Problem - Room has friable asbestos-containing materials which are either damaged or are being exposed to continual disturbance. Due to these conditions, there is a high potential for exposure and/or transferral of material to other areas of the building. Abatement should be undertaken as soon as possible.

ASBESTOS SURVEY
TABLE I
MATERIAL IDENTIFICATION

Client # M-25 Project # M87-1051 Location: Lock & Dam #8
Genoa, Wi

Location	Material	Asb	Ref	Rating
CCS main rm & office	Suspended Ceiling tiles	no	H1	0
CCS above ceiling	Fiberglass batting	no	H2	0
CCS bathroom	Suspended Ceiling tiles	no	H3	0
CCS original wall material	plaster cement	no	H4	0
CCS basement	Fibergalss insulation	no	H5	0
Upper & lower control station	insulation pasted on inside	yes	H6	4
comfort station	N/A			
workshop	insulation with yellow fiberglass	no	G2	0
Wooden box on top of gray cabinet	misc. gaskets	yes	E15	3
Galleries	cable trays	yes	A8	1
Dam: 5 piers 10 control cabinets for tainter gates	black circuit boards	yes	A1	1
	in control cabinets	yes	A1	1
	wiring			
5 electrical heating units	gasket and wiring	yes	E15 E13	1
Pole shed	N/A			
Lock and dam	Brake shoe material	yes	H7	1
CCS electrical control panels	14 balck circuit boards	yes	A1	1
	black busse bars	*	—	1
	grey and black wiring	yes	B1	1

ASBESTOS SURVEY
TABLE II
SAMPLE ANALYSES

Client #: M-25 Project #: M87-1051 Location: Lock & Dam #8
Genoa, Wi

Sample #	Location	Description	%Asbestos
H1	CCS main rm & office 1.5'x1.5' suspended ceiling panels	White/greyish	N.D.
H2	Fiberglass batting above suspended ceiling panels	Paper/pink & yellow fiberglass	N.D.
H3	CCS bathroom suspended ceiling tiles	White/composite wood board	N.D.
H4	CCS wall plaster	Yellow paint/ cementitious	N.D.
H5	CCS basement	Paint/paper/foil fiberglass	N.D.
H6	upper & lower control stations	silver/white fibrous tar	chrysotile 85
H7	Spare brake shoe material from lift	brake material	chrysotile 33

-- End of Section --

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DIVISION 14 - CONVEYING SYSTEMS

SECTION 14630

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SECTION 14630

ELECTRICAL OVERHEAD MONORAIL HOIST AND BEAM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

American Gear Manufacturers Association (AGMA)

AGMA 6010-E	(1988) Standard for Spur, Helical, Herringbone, and Bevel Enclosed Drives
AGMA 6019-E	(1989) Gearmotors Using Spur, Helical, Herringbone, Straight Bevel, or Spiral Bevel Gears
AGMA 6021-G	(1989) Shaft Mounted and Screw Conveyor Drives Using Spur, Helical and Herringbone Gears

American Institute of Steel Construction (AISC)

AISC S329	(1986) Specification for Structural Joints Using ASTM A325 or A 490 Bolts
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American National Standards Institute (ANSI)

ANSI B30.2	(1990) Standard for Overhead and Gantry & B30.2a-1985 Cranes (Top Running Bridge, Single & B30.2b-1986 or Multiple Girder, Top Running & B30.2c-1987 (Trolley Hoist)
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American Society for Testing and Materials (ASTM)

ASTM A 159	(1983, R93) Automotive Gray Iron Castings
ASTM A 325	(1996) High-Strength Bolts for Structural Steel Joints
ASTM A 668	(1996) Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A 438	(1995) Specification for Sintered Bronze (R 1989) Bearings (Oil Impregnated)
ASTM A 439	(1995) Specification for Iron-Base Sintered Bearings (Oil Impregnated)
ASTM A 612	(1996) Specification for Iron Bronze

sintered Bearings (Oil Impregnated)

American Welding Society (AWS)

AWS D1.1 (1996) Structural Welding Code-Steel

AWS D14.1 (1985) Specification for Welding
Industrial and Mill Cranes and Other
Material Handling Equipment

Crane Manufacturers Association of America (CMAA)

CMA 74 (1987) Specification for Top Running and
Under Running Single Girder Electric
Overhead Traveling Cranes

Monorail Manufacturer's Association (MMA)

MMA () Specification for Underhung Cranes and
Monorail Systems

National Electrical Manufacturers Association (NEMA)

NEMA ICS 2 (1993) Industrial Control Devices, Incl
Rev 1 Controllers and Assemblies

NEMA ICS 6 (1993) Enclosures for Industrial Controls
and Systems

NEMA MG 1 (1993) Motors and Generator Standards

National Fire Protection Association (NFPA)

NFPA 70 (1996) National Electrical Code

Underwriter's Laboratories, Inc. (UL)

UL 489 (1990) Molded-Case Circuit Breakers and
Circuit Breaker Enclosures

UL 1004 (1989) Electric Motors

UL 1449 (1986) Surge Suppressors, Transient
Voltage

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Spare Parts Data; FIO.

After approval of the shop drawings and not later than one month prior to the date of beneficial occupancy, the Contractor shall furnish spare parts data for each different item of material and equipment specified. The data

shall include a complete list of parts and supplies, with current unit prices and source of supply.

SD-04 Drawings

Monorail Drawings; GA.

Shop drawings shall consist of a complete list of equipment and materials, including manufacturer's descriptive and technical literature; performance charts and curves; catalog cuts; and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work, including clearances for maintenance and operation. Specific shop drawings shall include the following:

- a. layout drawing of the monorail crane rail. Include wiring drawings and schematics.
- b. Wire Rope hoist. Include dimensional data, performance data, and load rating criteria.

SD-06 Instructions

Monorail Instructions; FIO.

- a. The Contractor shall furnish four complete copies of operating instructions outlining the step-by-step procedures required for system startup, operation, and shutdown. The instructions shall include the manufacturer's name, model number, service manual, part lists, and brief description of all equipment and their basic operating features. Operating instructions shall include all approved shop drawings. Final performance test reports shall be included.
- b. The Contractor shall furnish four complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns, repairs, and a trouble-shooting guide. The instructions shall include equipment layout, simplified wiring, and control diagrams for the system as installed.
- c. Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal, safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams, and posted beside the diagrams. Proposed diagrams, instructions, and other sheets shall be submitted prior to posting. The framed instructions shall be posted before acceptance testing of the systems.

SD-09 Reports

Performance Test Reports; FIO.

Upon completion and testing of the installed system, test reports shall be submitted in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the

specified performance criteria. The report shall include the information as required by paragraph: ACCEPTANCE TESTING.

Design Calculations; FIO.

Design calculations for the monorail and hangers shall be submitted. Design calculations shall be stamped by a Registered Professional Engineer.

PART 2 PRODUCTS

2.1 GENERAL

2.1.1 Single Responsibility and Standard Products

All work furnished under this section shall be provided by a single supplier who shall take the complete responsibility for the complete package furnished. Materials and equipment shall be standard products of manufacturers regularly engaged in the fabrication of hoists and monorails and shall essentially duplicate items that have been in satisfactory use for at least two years prior to bid opening.

2.1.2 Nameplates

Each major component of equipment shall have the manufacturer's name, address, type or style, model or catalog number, and serial number on a plate secured to the equipment.

2.1.3 Verification of Dimensions

The Contractor shall verify all dimensions in the field by measurement and shall advise the Contracting Officer of any discrepancy with contract documents before performing any work.

2.1.4 Welding

Welding shall be in accordance with qualified procedures using AWS D14.1 and D1.1, as modified herein. All welding shall be performed indoors, and the surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Minimum preheat and interpass temperatures shall conform to the requirements of AWS D1.1. Welding shall be performed in accordance with written procedures that specify the Contractor's standard dimensional tolerances for deviation from camber and sweep. Such tolerances shall not exceed those specified in accordance with AWS D1.1. Allowable stress ranges shall be in accordance with MMA specification. Welding of beam shall conform with AWS D1.1. Welders, welding operators, and welding procedures shall be qualified or prequalified in accordance with AWS D1.1, in lieu of AWS D14.1.

2.1.5 Manufacturer's Services

Services of a manufacturer's representative who is experienced in the installation, adjustment, erection, and operation of the equipment specified shall be provided. The representative shall supervise the installation, adjustment, and testing of the equipment.

2.1.6 Delivery and Storage

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

2.1.7 Design Criteria

The hoist and beam shall be designed to operate in the space indicated. The beam shall be attached to the overhead structure at the locations shown on the drawings, and the trolley shall be standard headroom type. The hook vertical travel shall not be less than 8 inches above the floor.

2.1.7.1 Classification

The crane shall be designed and constructed to CMAA-74 moderate service requirements for operation in nonhazardous environment.

2.1.7.2 Rated Capacity and Speeds

The rated capacity of the hoist and beam shall be 2 tons. The load block and hook shall not be considered part of the rated capacity. Rated speed (in feet per minute) for the hoist and trolley shall be as follows.

Rated Speeds (fpm)

	Maximum	Minimum
Hoist	15	12
Trolley	60	40

2.1.7.3 Capacity Plate

Two capacity plates shall be provided, one for each side of the hoist. Each plate shall be lettered to indicate the total rated hoisting capacity. All lettering shall be of sufficient size to be easily read from the floor. The lower load block shall be marked with the hoist rated capacity.

2.2 STRUCTURAL MATERIALS

2.2.1 Bolts, Nuts, and Washers

Bolts, nuts, and washers shall conform to ASTM A 325 bolts. High-strength bolted connections shall conform to the requirements of the AISC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts, except that ASTM A 490 bolts shall not be used. No galvanized bolts shall be used.

2.2.2 Trolley Frame

Trolley frame shall consist of two structural steel side frames or trucks welded together with one or more structural steel load girts to form a one-piece unit. Pads shall be provided for the use of jacks or wedges when changing truck wheels.

2.2.3 Stops and Bumpers

Structural trolley stops shall be provided on the beam to engage the trolley wheels. Stops shall be located to permit maximum trolley travel.

2.2.4 Beam

The beam shall be of the size recommended by the hoist manufacturer.

2.3 HOIST AND TROLLEY

2.3.1 General

Hoist shall be heavy duty, electric, wire rope type. Hoist, trolley, and beam shall be furnished by the same supplier. Hoist shall be completely factory assembled. Hoist and beam shall be rated at 2 tons capacity.

2.3.2 Trolley Drives

Trolleys shall be motor driven for operation on the beam as shown. The trolley shall have a drive arrangement that has two wheels driven. Wheels shall be steel with heat treated crowned treads. Motor for trolley drive shall be squirrel cage, totally enclosed non-ventilated (TENV) right angle gear motor.

2.3.3 Hoist Load Block

Load block shall be of steel construction. Load block shall be provided with swivel mounting for the hook. Sheave bearing lubrication fittings shall be recessed within the sheave pin or adequately guarded to prevent damage.

2.3.4 Hook Assembly

Hook shall be single barbed and shall be made of forged steel complying with ASTM A 668. Hooks shall be fitted with safety latch designed to preclude inadvertent displacement of slings from the hook saddle. No painting or welding shall be performed on the hook. Hook material and any heat treatment performed shall be stamped on the hook shank or documented in certification papers furnished with the hook. Hook shall be commercially rated and shall have a minimum proof load of twice the safe working load and a minimum straightening load of four times the safe working load.

2.3.5 Hoisting Ropes

Hoisting ropes shall be regular lay, preformed, uncoated, improved plow steel, 6 by 37 construction, with independent wire rope core. Wire rope shall be designed for hoisting service. The hoisting ropes shall be selected such that the rated capacity load, plus the load block weight, divided by the number of parts of rope, shall not exceed 20 percent of the certified breaking strength of the rope. Hoisting ropes shall be secured to the hoist drum so that no less than two wraps of rope remain at each anchorage of the hoist drum at the extreme low position (limit switch stop).

2.3.6 Sheaves

Sheaves shall be of cast steel, forged, rolled, or welded structural steel. Sheave grooves shall be accurately machined, smoothly finished, and free of surface defects.

2.3.7 Hoist Drum

Hoist drum shall be of welded rolled structural steel, cast steel, or seamless steel pipe. Drum shall be machined and provided with right- and left-hand grooves, including two dead grooves at each of the two anchor points, as may be applicable.

2.3.8 Gearing

Gearing shall be of the enclosed type and shall be an integral part of the hoist. The gears and pinions shall be spur, helical, or herringbone type only and shall be forged, cast, or rolled steel, except that drum gears may be of welded construction.

2.3.9 Gear Reducers

Gear reducers shall be an integral part of the hoist. Gear reducers shall be designed, manufactured, and rated in accordance with AGMA 6010-E, AGMA 6019-E, or AGMA 6021-E (for trolley drives only), as applicable.

2.3.10 Brakes

Brakes shall be of the shoe or disk type with thermal capacity suitable for Class C service. Shoe and disk brakes shall be spring set and electrically released by a continuously rated, direct-acting magnet. All brakes shall be self-aligning and provide for easy adjustment for torque setting and lining wear. Brake wheels shall be cast iron conforming to ASTM A 159 or shall be the manufacturer's standard high-strength ductile cast iron, provided that the material exhibits wear characteristics in the form of powdered wear particles and is resistant to heat checking. Disk brakes shall be totally enclosed and have multiple disks with stationary releasing magnets. Brake torque shall be easily adjustable over a 2:1 torque range.

2.3.10.1 Hoist Holding Brakes

The hoist shall be equipped with at least one holding brake. The holding brake shall be a friction brake of the shoe design or disk type and shall be applied to the motor shaft or to the gear reducer shaft.

2.3.10.2 Hoist Control Brake

Hoist shall be equipped with an integral mechanical load brake of the "Weston" type or multiple disk type. The multiple disk type brake shall be provided with external adjustment for wear.

2.3.11 Bearings

All bearings, except those subject only to small rocker motion, shall be of the antifriction type. Equalizer sheaves shall be equipped with sintered oil-impregnated type bushings in accordance with ASTM B 438, ASTM B 439, or ASTM B 612.

2.3.12 Antidrip Provisions

The hoist and trolley shall be designed to preclude leakage of lubricants onto the lifted loads or the floor. Equipment and components that cannot be made leakproof shall be fitted with suitable drip pans. The drip pans shall be made of steel and shall be designed to permit removal of the collected lubricant.

2.3.13 Lubrication System

Splash type oil lubrication system shall be provided for the hoist and trolley gear cases. Oil pumps shall be of the reversible type capable of

maintaining the same oil flow direction and volume while being driven in either direction. Electric motor-driven pumps may be used when the input shaft speed is too low at any operating condition to ensure adequate oil flow. In such applications, the pump shall be energized whenever the drive mechanism brakes are released.

2.4 ELECTRICAL COMPONENTS FOR HOIST AND TROLLEY

Controls, starters, and disconnects shall be furnished with the hoist. Controls shall be integral with the hoist and include heavy duty reversing contactors and low voltage transformer.

2.4.1 Hoist Control System

A 6 push-button station shall be furnished for the hoist and trolley.

2.4.2 Power Sources

Hoist shall be designed to be operated from a 480 volt, three-phase, three-wire, 60 hertz power source.

2.4.3 Transformers

Transformers shall be dry type and shall carry full load continuously at rated voltage and frequency without exceeding an average temperature rise of 115 degrees C above an ambient temperature of 40 degrees C. The transformer shall have a totally enclosed case, which shall be finished to resist corrosion. Transformers shall be fully encapsulated, except for those specifically designed for use as an isolation transformer for static power conversion units.

2.4.4 Motors

Motors shall be designed specifically for crane and hoist duty. Drain holes shall be provided at low points near each end. Inspection and service covers shall be provided with gaskets. All hardware shall be corrosion-resistant. Motors shall conform to the requirements of NFPA 70, NEMA MG 1, and UL 1004.

2.4.5 Hoist Motor

The hoist motor shall be industrial type, single-speed, 2 horsepower rating. If the supplier elects to provide a larger motor, the Contractor shall be responsible for increasing power source wiring, as may be required, at no additional cost to the Government. The hoist motors shall be provided with Class B insulation, with a 30-minute minimum motor time rating to satisfy NEMA permissible motor temperature rise above 40 C ambient.

2.4.6 Trolley Drive Motor

The trolley drive motor shall be industrial type, single-speed, single-winding, NEMA Design B, squirrel-cage ac type, rated 1/2 horsepower. If the supplier elects to provide a larger motor, the Contractor shall be responsible for increasing the power source wiring, as may be required, at no additional cost to the Government. The trolley drive motor shall be provided with Class B insulation, with a 30-minute minimum motor time rating to satisfy NEMA permissible motor temperature rise above 40 C ambient permitted by Class B insulation.

2.4.7 Control System

Controllers shall be provided for the motors. Overload protection shall be in conformance with the requirements of NEMA ICS 2. Contacts used for starting, stopping, and reversing shall be mechanically and electrically interlocked. Alternatively, the hoist motor can be furnished with thermostats that will shut down the motor at high temperatures.

2.4.8 Control Panel

Hoist control panel shall be integral with the hoist and form a continuous unit. Panel shall be NEMA 3R rated.

2.4.9 Hoist Control

The hoist motor control system shall provide one speed in each direction by means of an electrically operated, full- magnetic, across-the-line reversing type starter, NEMA Size 1 or Definite Purpose rated contactors.

2.4.10 Trolley Drive Control

The trolley drive main control systems shall provide one speed in each direction by means of an electrically operated, full-magnetic, across-the-line reversing type starter, NEMA Size 1 or Definite Purpose rated contactors. Centrifugal switches shall be provided and used in the control circuit to prevent the plugging of trolley drive motor; each switch shall be arranged to set the associated drive's brake while attempts are made to plug.

2.4.11 Pendant Control Station

The pendant control station shall be suspended from the hoist by a strain chain or 1/4 inch (minimum) wire rope strain lead of corrosion-resistant steel. The pendant control station enclosure shall be NEMA Type 4/12. Push buttons shall be heavy-duty, dust-tight and oil-tight type having distinctly felt operating positions. Push buttons shall be constructed so that they cannot become hung-up in the control case. Pendant shall include a separate set of push buttons for each motion and for POWER ON-POWER OFF.

2.4.12 Push buttons

Push buttons shall be as follows:

Hoist - Up	Trolley - Forward
Hoist - Down	Trolley - Reverse
POWER OFF	
POWER ON	

The POWER OFF push button shall have a bright red mushroom head.

2.4.13 Protection

A mainline disconnect shall be provided. The mainline disconnect shall be controlled by a control circuit, such that all crane motions shall be stopped upon mainline undervoltage, overload, control circuit fuse failure, or operation of the POWER OFF push button.

2.4.14 Surge Protection

Three metal oxide varistors shall be provided on the line side of each transformer to provide transient overvoltage protection. Surge suppressors shall meet the requirements of UL 1449.

2.4.15 Circuit Breakers

Circuit breakers shall meet the requirements of UL 489. Fuses shall not be used for motor circuit protection. Separate branch breakers shall be provided for the hoist motor and the trolley drive. The branch breakers and the mainline breaker shall be properly coordinated to provide all branch circuit protection required for the hoist, except for main power electrification.

2.4.16 Overloads

AC circuit overload relays shall be of the ambient compensated, automatic reset, inverse time type located in all phases of the mainline and individual motor circuits.

2.4.17 Limit Switches

Limit switches shall be heavy-duty, quick-break, double-pole, double-throw type and shall conform to NEMA ICS 2. Geared limit switch interruption of a motion in one direction shall not prevent the opposite motion. Geared limit switches shall reset automatically. Limit switch housings shall be NEMA Type 12 or 13. Limit switches shall interrupt power to the primary control systems. Limit switches shall be contained in the standard hoist control enclosure.

2.4.18 Hoist Upper Limit Switches

Two limit switches shall be provided for the hoist. A rotating type adjustable geared control circuit interrupt limit switch shall provide hoist-up limiting. A secondary hoist upper limit shall be provided. This shall also be a geared limit switch to prevent raising beyond the hoist's safe limit. This secondary limit switch shall operate to interrupt power to all hoist motor conductors and set the hoist holding brakes.

2.4.19 Hoist Lower Limit Switches

Hoists shall be provided with a rotating type adjustable geared control circuit interrupt limit switch for hoist-down travel limiting.

2.4.20 Wiring

All wire runs shall be numbered or tagged at connection points. All splices shall be made in boxes or panels at terminals. Motor loop and branch circuit and brake conductor selection shall be based on the continuous duty rating of NFPA 70 for 60 C conductors, and all other conductors shall be selected based on their 60-minute short-time rating. Insulation for wiring shall be 600 volt, Type MTW. Conductors in the vicinity of, or connected to, resistors shall be Type TFE. All control wiring shall be 16 AWG or larger. All power wiring shall be 12 AWG or larger.

2.5 ELECTRIFICATION OF HOIST AND TROLLEY

The main power electrification system shall provide power to the hoist mainline disconnect circuit breaker. The electrification system shall be a UL-listed, enclosed conductor system rated for at least 90 amperes

continuous at 600 Vac, and operated at 480 Vac, three-phase, three-wire, 60 hertz.

2.5.1 Conductor System

The conductor system shall be a side or bottom contact system mounted on the monorail beam. Separate conductors shall be provided for each phase. The conductor system shall be connected at one end to a wall-mounted disconnect switch, as shown on the drawings. Self-cleaning collectors shall be mounted on the trolley. Collectors shall be UL-listed and rated for at least 30 amperes at 600 volts. Insulated caps shall be installed over all exposed ends of conductor runs. All hardware shall be corrosion-resistant.

PART 3 EXECUTION

3.1 ERECTION

Erection shall be in accordance with the manufacturer's instructions and as indicated.

3.1.1 Erection

Major components of the hoist and beam shall be shop- assembled as completely as possible. After complete shop testing, disassembled parts shall be match-marked and electrical connections shall be tagged. All parts and equipment at the site shall be protected from weather, damage, abuse, and loss of identification. The erection procedures shall ensure that the hoist and beam are erected without initial stresses, forced or improvised fits, misalignments, nicks of high- strength structural steel components, stress-raising welds, and rough burrs. After the hoist and beam are erected, any damaged painted surfaces shall be cleaned and repainted.

3.1.2 Mechanical Alignment

All motors, couplings, brakes, gearboxes, and drive components shall be aligned when reinstalled, in accordance with manufacturer's instructions.

3.1.3 Electrical Alignment

The control system shall be aligned in accordance with manufacturer's instructions. All controls, starters, and disconnects shall be furnished with the hoist. Alignment data shall include timer settings, resistor tap settings, potentiometer settings, test point voltages, supply voltages, motor voltages, motor currents, and test conditions, such as ambient temperature, motor load, date performed, and person performing the alignment. A copy of the final alignment data shall be stored in the control panel door. Electrical hookup shall be in accordance with SECTION: LOCK ELECTRICAL WORK.

3.2 ACCEPTANCE TESTING

3.2.1 Hoist and Beam Acceptance Test

The Contractor shall provide all personnel and equipment necessary to conduct the tests, including, but not limited to, hoist operators, riggers, rigging gear, and test weights. Testing shall be performed in the presence

of Contracting Officer. The Contractor shall notify the Contracting Officer 15 days prior to testing operations.

3.2.1.1 Test Sequence

The hoist shall be tested according to the applicable paragraphs of this procedure in the sequence provided.

3.2.1.2 Test Data

Hoist test data shall be recorded on appropriate test record forms suitable for retention for the life of the hoist. Operating and startup current measurements shall be recorded for electrical equipment (motors and coils) using appropriate instrumentation. Speed measurements shall be recorded as required by the facility evaluation tests (normally at 100 percent load). Recorded values shall be compared with design specifications or manufacturer's recommended values; abnormal differences shall be justified in the remarks or appropriate adjustments performed. In addition, high temperatures or abnormal operation of any equipment or machinery shall be noted, investigated, and corrected. Hoist and trolley speeds should be recorded during each test cycle.

3.2.1.3 Equipment Monitoring

During the load test, improper operation or poor condition of safety devices, electrical components, mechanical equipment, and structural assemblies shall be monitored. Observed defects critical to continued testing shall be reported immediately to the Contracting Officer, and testing shall be suspended until the deficiency is corrected. During and immediately following each load test, the following inspections shall be made:

- (a) Inspect for evidence of bending, warping, permanent deformation, cracking, or malfunction of structural components.
- (b) Inspect for evidence of slippage in wire rope sockets and fittings.
- (c) Check for overheating in brake operation; check for proper stopping. All safety devices, including emergency stop switches and POWER OFF push buttons, shall be tested and inspected separately to verify proper operation of the brakes.
- (d) Check for abnormal noise or vibration and overheating in machinery drive components.
- (e) Check wire rope sheaves and drum spooling for proper operation, freedom of movement, abnormal noise, or vibration.
- (f) Check electrical drive components for proper operation, freedom from chatter, noise, or overheating.
- (g) Inspect external gears for abnormal wear patterns, damage, or inadequate lubrication.

3.2.1.4 Hooks

Hooks shall be measured for hook throat spread before and after load test. A throat dimension base measurement shall be established by installing two tram points and measuring the distance between these tram points (to within

1/64 inch). This base dimension shall be recorded. The distance between tram points shall be measured before and after load test. An increase in the throat opening by more than 1 percent from the base measurement shall be cause for rejection.

3.2.2 No-Load Testing

a. Hoist and Limit Switch Test. The load hook shall be raised and lowered through the full range of normal travel at rated speed. The load hook shall be stopped below the geared limit switch upper setting. Proper operation of upper and lower limit switches for primary motions shall be verified. The test shall be repeated a sufficient number of times (minimum of three) to demonstrate proper operation. Brake action shall be tested in each direction. The proper time delay shall be verified between the actuation of the dual brakes.

b. Trolley Travel. The trolley shall be operated the full distance of the runway. The trolley bumpers shall contact the trolley stops located on the runway rail.

c. Hoist Loss of Power No-Load Test. Using primary drive, the hook shall be raised to a height of approximately 8 feet. While lowering the hook, the main power source shall be disconnected verifying that the hook will not lower and that both brakes will set.

3.2.3 Load Test

3.2.3.1 Hoist

Unless otherwise indicated, the following tests shall be performed using a test load of 125 percent (plus 5 percent, minus 0 percent) of rated load.

a. Hoist Static Load Test. Holding brakes and hoisting components shall be tested by raising the test load approximately 1 foot and manually releasing one of the holding brakes. The load shall be held for 10 minutes. The first holding brake shall be reapplied, and the second holding brake shall be released. The load shall be held for 10 minutes. Any lowering that may occur indicates a malfunction of the brakes or lowering components.

b. Dynamic Load Test. The test load shall be raised and lowered through the full range. The machinery shall be completely stopped at least once in each direction to ensure proper brake operation.

c. Hoist Load Brake. With test load raised approximately 5 feet and with the hoist controller in the neutral position, the holding brake shall be released. The load brake shall be capable of holding the test load. With the holding brake in the released position, the test load shall be lowered (first point) and the controller shall be returned to OFF position as the test load lowers. The load brake shall prevent the test load from accelerating.

d. Hoist Loss of Power Test. After raising the test load to approximately 8 feet and slowly lowering the test load, the main power source and the control push button shall be released verifying that the test load will not lower and that both brakes will set.

e. Beam Dynamic Load Test. Operate the trolley the full distance of the beam in each direction with test load on the hook (one cycle).

Confirm that no permanent deflections have occurred and no fasteners have loosened.

f. Trolley Dynamic Load Test. While operating the trolley the full distance of the runway in each direction with test load on the hook (one cycle), the proper functioning of all primary drive points shall be tested.

3.2.3.2 Trolley Loss of Power Test

Using a test load of 100 to 105 percent of rated load, the load shall be raised clear of any obstructions on the operating floor. Starting at a safe distance from walls or other obstructions, a slow speed shall be selected using the trolley primary drive. While maintaining a safe distance to obstructions, the main power source shall be disconnected and the brakes shall be verified to have set and the equipment shall stop within the distance recommended by the manufacturer.

3.3 FIELD TRAINING

A field training course shall be provided for designated operating staff members. Training shall be provided for a total period of two hours of normal working time and shall start after the system is functionally complete, but prior to final acceptance tests. Field training shall cover all the items contained in the operating and maintenance instructions.

-- End of Section --